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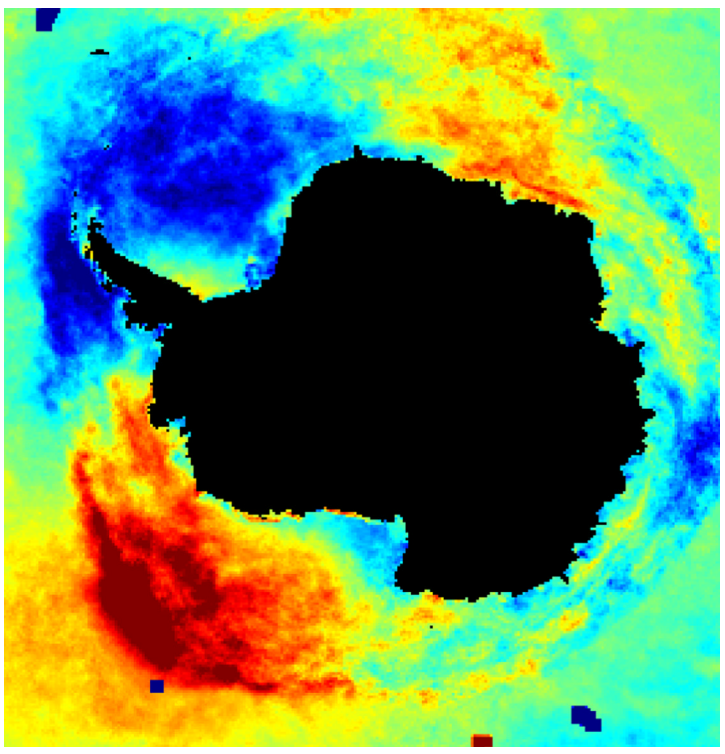
theme EARTH

El Niño tied to Antarctic climate change

By Alan Buis



This surface temperature map shows the average pattern of warming and cooling of the southern ocean around Antarctica associated with El Niño episodes. Warming is represented by red and cooling by blue. The intensity of the warming is strongest in the Amundsen and Ross Seas, located in the Pacific sector of the southern ocean. In contrast, the cooling is strongest in the Bellingshausen and Weddell Seas in the Atlantic Sector.

NASA *researchers have found strong relationships between El Niño episodes and changes in climate and sea ice cover around Antarctica.*

Identifying these relationships is important because it provides new insights into the changing characteristics of the Antarctic region and their role in Earth's climate system.

The findings, published in the March 1 issue of the American Meteorological Society's Journal of Climate, show that although the total ice coverage of the southern ocean has not changed significantly over the last 20 years, the El Niño and its related Southern Oscillation appear to affect regional ice distributions. The oscillation is a recurring warming and cooling of the surface ocean in the central and eastern Pacific. El Niño refers to the warm phase of the oscillation.

"Understanding the connection between the Southern Oscillation and southern ocean climate and the sea ice cover will substantially improve our understanding of global climate," said Dr. Ron Kwok, a senior research scientist at JPL. "Our study concludes that the southern ocean's climate and ice cover is somehow connected to climate in the tropical latitudes. While we don't know yet the cause-and-effect relationship between the two, we do know the changes in sea ice cover cannot be explained by local climate variations alone and are instead linked to larger scale climate phenomena.

The study was conducted by scientists at JPL and NASA's Goddard Space Flight Center, Greenbelt, Md. It is based on data from 1982 to 1999. The NASA scientists also noted changes in sea ice cover in regions not normally associated with El Niño, such as the Weddell Sea east of the Antarctic peninsula.

The strongest links were observed in the Amundsen, Bellingshausen and Weddell seas of the west Antarctic, where the connections are localized and well defined. Within these sectors, higher sea level pressure, warmer air temperature and warmer sea surface temperature are generally associated with the El Niño phase.

Off-the-shelf camera device to hunt for distant planets

By Jane Platt

It could fit on your desk, and it's made mostly from parts bought at a camera shop, but two scientists believe their new instrument will help them find a slew of large planets orbiting stars in our Milky Way galaxy.

"An amateur astronomer could do this, except maybe for the debugging of the software, which requires several people working 10 hours a day," said Dr. David Charbonneau of Caltech. "But it's easy to understand what's going on and cheap to build the equipment. That's why everyone thinks it's an ideal project, if it works."

The assembly of the new instrument is a cooperative effort between Charbonneau and Dr. John Trauger of JPL. "David's approach promises to locate new planets orbiting distant stars," Trauger said. "The instrument is simple and straightforward, taking advantage of spare parts and computer code we already have on hand at JPL, and we hope to have it up and running in a few months."

Charbonneau and his colleagues will soon use their gizmo to begin a three-year survey for extra-solar planets at Palomar Observatory in San Diego County. The instrument is based on a standard telephoto lens for a 35-millimeter camera. It will sweep the skies, looking for "hot Jupiters," or large, gaseous planets, as their fast orbits take them in front of other stars, into the line of sight between a star and Earth. Astronomers will watch for the "wink" from the star as an orbiting planet partially blocks its light.

The new instrument uses a standard 300-millimeter Leica camera lens, with a charge-coupled device, or CCD. The CCD, which costs $22,000, will be mounted in a specially constructed camera housing to fit at the back of the lens. The entire device will be fitted onto an inexpensive equatorial mount, available at many stores carrying amateur astronomical equipment.

"Basically, the philosophy of this project is that, if we can buy the stuff we need off the shelf, we'll buy it," Charbonneau said. The project costs $100,000, a fraction of the cost of most large Earth- and space-based telescopes.

The Palomar staff will provide a small dome for the instrument, and the system will be automated so it can be operated remotely.

40 years ago at JPL...

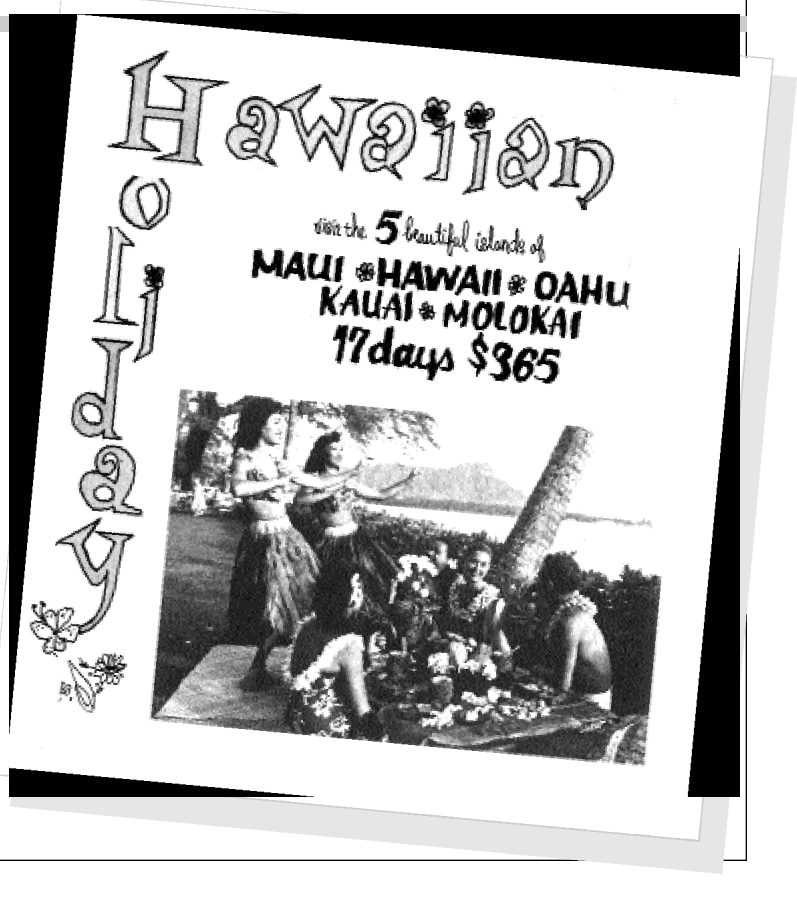
With JPL's year-long celebration of 40 years of planetary exploration now underway, Universe will each month provide a look back at what was happening at the Laboratory four decades ago.

At right is an advertisement in Universe's predecessor, "Lab-Oratory," offering JPLers a summer 1962 Hawaii getaway. Seems like an impossible bargain today, but the publication noted that the tour—which included airfare, hotels, meals and other extras—could be financed through the credit union.

Also from winter 1962:

Ranger 3 was launched Jan. 26. The Ranger project of the 1960s was the first U.S. effort to launch probes directly toward the moon. An inaccuracy put Ranger 3 off course and it missed the moon. The mission included the maiden voyage of the gamma ray spectrometer, which was to survey the moon's crust.

Ranger 3 was one of nine Ranger missions launched between 1961 and 1965. The spacecraft were designed to relay pictures and other data as they approached the moon and finally crash-land onto its surface. A variety of difficulties plagued the first several attempted missions in this series, but the later Rangers were finally a complete success.



News Briefs

Dr. James Bock

Bock receives presidential award

JPL astrophysicist DR. JAMES BOCK has received the Presidential Early Career Award for Scientists and Engineers.

The award is the highest honor bestowed by the U.S. government on outstanding scientists and engineers who are beginning their independent careers. The program is sponsored by the National Science and Technology Council, which implements the President's science and technology policy across the federal government.

DR. MICHAEL WERNER, JPL senior research scientist and principal scientist for the Space Infrared Telescope Facility, nominated Bock for the award.

"It is important that the world know that JPL has world-class scientists," said Werner. "Bock provided the key detector elements for two experiments that have put our understanding of the early universe on solid footing and have set the stage for further exploration."

Bock builds detectors and instruments for far infrared millimeter wave astrophysics. Bolometer instruments developed by Bock were used in a recent balloon-borne experiment called Boomerang to detect minute fluctuations in the cosmic microwave background, showing the geometry of the universe is essentially flat. Bolometers sense thermal radiation in the same way humans can feel the warmth from sunlight with their hands, but are many times more sensitive.

A ceremony in Washington, D.C. will honor Bock and other awardees. They will each receive $500,000 over a five-year period for research. Bock plans to use the funding to develop a new experiment to study the polarization, or the specific light properties, of the cosmic microwave background. A relic of the Big Bang, the cosmic microwave background arose when the universe was 1,000 times hotter and denser than it is today. It gives us a snapshot of the universe when it was just 300,000 years old, a tiny fraction of its current age of 15 billion years. The physical properties of the universe at that time imprinted signatures in the structure and polarization of the cosmic microwave background that we detect today.

Bock received his bachelor's degree in physics and math from Duke University and his doctorate in physics from UC Berkeley. He has been at JPL since 1994.

Halpern honored by scientific society

DR. DAVID HALPERN, a JPL senior research scientist, has been named a fellow of the American Association for the Advancement of Science.

He was presented with a certificate and rosette pin at the society's annual meeting in Boston on Feb. 16. Halpern was inducted in recognition of his "basic research in air-sea interactions in tropical oceans and for coordinating international efforts in measuring ocean surface quantities from satellites."

The American Association for the Advancement of Science is the world's largest federation of scientists. The organization began honoring individuals with the fellow designation in 1874 to recognize contributions in all fields of science.

Halpern joined JPL in 1986 and is currently manager of the climate variability program. His research focuses on using satellite measurements to understand how the wind creates ocean currents and redistributes temperatures. His recent studies include El Niño, the intertropical convergence zone in the South Pacific and monsoons in the Arabian Sea. He is also chairman of the Committee on Space Research Scientific Commission on Space Studies of the Earth's Climate, an international organization that reports to the United Nations.

Halpern received his bachelor's degree, with honors, in geology and physics from McGill University, Montreal, and his doctorate in oceanography from the Massachusetts Institute of Technology. He has served as visiting professor at Caltech and is an adjunct professor at UCLA. He is a fellow of the American Geophysical Union, a fellow of the American Meteorological Society and an honorary fellow of the California Academy of Sciences. His awards include the NASA Special Service Award and the NASA Outstanding Leadership Medal.

Dr. David Halpern

Hubble sees bow shock in Orion

Astronomers using NASA's Hubble Space Telescope have found a bow shock around a very young star in the nearby Orion nebula, an intense star-forming region of gas and dust.

A picture from the Hubble Heritage team is available at *http://www.jpl.nasa.gov/images/wfpc*. It was taken in February 1995 as part of the Hubble Orion Nebula mosaic by Hubble's Wide Field and Planetary Camera 2, designed and built by JPL.

Named for the crescent-shaped wave a ship makes as it moves through water, a bow shock can form in space when two gas streams collide. In this case, the young star, LL Ori, emits a vigorous wind, a stream of charged particles moving rapidly outward from the star. Our own sun has a less energetic version of this wind that is responsible for auroral displays on the Earth.

Unlike a water wave from a ship, this interstellar bow shock is three-dimensional. The filamentary emission has a distinct boundary on the side facing away from LL Ori, but is diffuse on the side closest to the star, a trait common to many bow shocks.

A second, fainter bow shock can be seen around a star near the upper right-hand corner of the image. Astronomers have identified numerous shock fronts in this complex star-forming region and are using this data to understand the complex phenomena associated with star birth.

The Orion nebula is a close neighbor in our Milky Way galaxy, at only 1,500 light-years from Earth. The filters used in the color composite represent oxygen, nitrogen, and hydrogen emissions.

CEC summer camp signups March 23

Registration is now underway for the JPL/Caltech Child Educational Center's summer camp, "Exploring Our Natural World." Signup day is set for Saturday, March 23 from 10 a.m. to 2:00 p.m. at the school's main campus at 140 Foothill Blvd., La Cañada.

The summer program, for children completing kindergarten through 6th grade, is held from June 24 through Aug. 28 at three locations: the Oak Grove site in La Cañada, next to La Canada High School; Palm Crest Elementary School in La Canada; and the CEC site in Pasadena, near Caltech.

The camp will feature arts and crafts, drama, music, creative writing, swimming, fun field trips, outdoor sports and games, gardening, water play and science exploration.

Families may apply for the full summer or for weekly sessions; however, enrollment is limited at each location. For information, call the CEC at ext. 4-3418. Brochures are also available in the ERC office.

Science festival for girls coming up

Caltech will host a March 23 science festival for members of former astronaut DR. SALLY RIDE's science club for girls in grades 6 through 8.

The Los Angeles Science Festival on campus will include workshops for both girls and adults. Registration will be from 8 to 9 a.m. Workshops will run through 1:30 p.m., followed by a street fair.

Twenty workshops on a variety of science topics will be offered, from which girls will choose two to attend. Presenters from JPL include Earth Science and Technology Director DR. DIANE EVANS; DR. ANN TAVORMINA, manager, Exploration Systems Autonomy Section 367; and DR. ANDREA DONNELLAN, deputy manager, Earth and Space Sciences Division.

For registration information, log on to *http://www.sallyridefestivals.com* or call (800) 561-5161.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Group—Meets the first and third Fridays of the month at noon in Building 111-117. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (The Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

Working Parents Support Group—Meets the third Thursday of the month at noon in Building 167-111 (The Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

Friday, March 15

Dr. Stephen Hawking—The renowned physicist will speak at 8 p.m. in Caltech's Beckman Auditorium. Admission is free, but guaranteed-admission tickets will be distributed, on the day of the event only, beginning at 9 a.m. at Beckman. Limit is two tickets per person; it is suggested that ticket holders return in time to be in line no later than 7:30 p.m. For more information, call (626) 395-4652.

Von Kármán Lecture Series—Robert Hogg of the Machine Vision Group, Autonomy and Control Section 345, will present "Autonomous Navigation for Urban Robots" at 7 p.m. in the Vosloh Forum at Pasadena City College, 1570 East Colorado Blvd. Open to the public.

Sunday, March 17

Chamber Music—The Arditti String Quartet will appear at 3:30 p.m. in Caltech's Dabney Lounge. Tickets are $27, $23, $19 and $15. For more information, call (626) 395-4652.

Tuesday, March 19

JPL Hiking+ Club—Meeting at noon in Building 238-543.

Tues.-Wed., March 19–20

Investment Advice—One-on-one counseling is available with TIAA-CREF in T-1720. For an appointment, call (877) 209-3140, ext. 2614.

Thursday, March 21

"Taking A Realistic Look At Equity Returns"—This seminar, to be held from 10 a.m. to noon in Building 180-101, will help participants gain a better perspective on equity performance by tuning out the fund choice "noise" and discussing how to best meet your financial goals. The focus will be on: how a wide selection of equity funds and short-term high returns can be counterproductive to efficient equity investing; investing in a wide range of asset classes as a wise approach; using TIAA-CREF's indexing and/or active management strategies as powerful investment alternatives; and the importance of costs relative to investment returns and Morningstar's star rating system.

TIAA/CREF Enrollment Meeting—To be held at noon in Building 180-101 to assist employees newly eligible for Caltech/JPL retirement plan participation in selecting investment options and completing enrollment forms.

"Asset Allocation"—This seminar will discuss the importance of a diversified portfolio to a sound investment plan and will be held from 1 to 3 p.m. in Building 180-101.

Investment Advice—One-on-one counseling is available with Fidelity Investments in T-1720. For an appointment, call (800) 642-7131.

Social Security—A representative will be available from 9:15 to 11:30 a.m. in T-1720. For an appointment, call the Benefits office at 4-3760.

JPL Stories—Dr. Moustafa Chahine, JPL senior research scientist and former chief scientist, will present "The Way the EC Thinks," from 4 to 5 p.m. in the the Library, Building 111-104. From downsizing to outsourcing, and from TQM to PBM, come hear personal accounts based on Chahine's 15 years on the JPL Executive Council. If you have questions about the JPL Story series or wish to participate, call Teresa Bailey at ext. 4-9233.

Saturday, March 23

Folk Music—Steve Gillette and Cindy Mangsen will perform at 8 p.m. in Caltech's Dabney Lounge. Tickets are $12 for adults, $4 for children under 12. For information, call (626) 395-4652.

Wofa!Percussion and Dance From Guinea, West Africa—Ten performers present a blend of ancient rituals and contemporary vision with drumming, dancing and chanting at 8 p.m. in Caltech's Beckman Auditorium. Tickets are $22, $18 and $14; youth high school age and under, $10. For information, call (626) 395-4652.

Tuesday, March 26

"Distributed Autonomy: Successfully Coordinating Multiple Spacecraft or Rovers"—Drs. Tony Barrett and Tara Estlin of JPL's Artificial Intelligence Group will speak at noon in the 167 conference room. This lecture is sponsored by the Exploration Systems Autonomy Section.

Wednesday, March 27

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Guests welcome. Call Joy Hodges at ext. 4-7041 for information.

Thursday, March 28

Caltech Architectural Tour—The Caltech Women's Club presents this free service, which is open to the public. The tour begins at 11 a.m. and lasts about 1 1/2 hours. Meet at the Athenaeum front hall, 551 S. Hill St. For information, call Susan Lee at (626) 395-6327.

JPL Golf Club—Meeting at noon in Building 306-302.

Twin satellites, launching March 16, will measure our planet's gravity field and water movement

TRACKING EARTH WITH GRACE

By Alan Buis and Mark Whalen

NASA and the German Space Agency have prepared for the Saturday, March 16 launch of the Gravity Recovery and Climate Experiment (Grace), a scientific pathfinder mission that will test a novel approach to tracking how water is transported and stored within the Earth's environment.

The JPL-managed mission will precisely measure the planet's shifting water masses and map their effects on Earth's gravity field, yielding new information on effects of global climate change.

The twin Grace satellites were set to launch at 1:23 a.m. Pacific time from Russia on a five-year mission that will revolutionize understanding of changes in the Earth's gravity field over time and space. The mission will provide measurements of the gravity field that are far more accurate and sensitive than any that can be obtained by ground-based observations or single remote-sensing spacecraft.

Grace marks the first launch in NASA's Earth System Science Pathfinder Program, designed to develop new measurement technologies for studying our Earth system, said Dr. Ghassem Asrar, associate administrator for NASA's Earth Science Enterprise. "Through NASA's continuing investment in technology development, we've been able to create an innovative mission at a fraction of the cost of missions formulated just a decade ago," Asrar said. "Grace will provide us with a new view of our home planet and help us to better understand climate change and its global impacts such as changes in sea level and the availability of water resources."

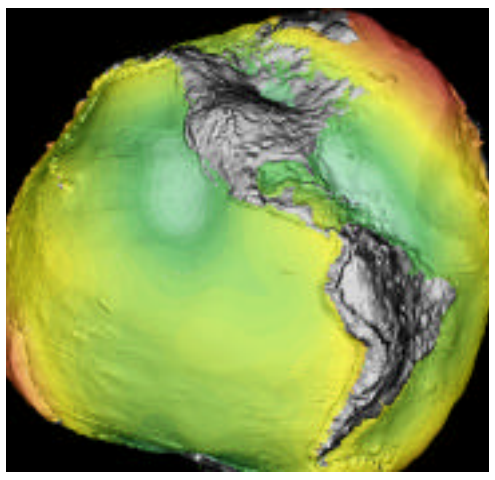


Image courtesy of German Georesearch Center

A more precise gravity map of Earth is expected to increase the accuracy of many techniques used by scientists who study Earth with space-based instruments. These techniques—ranging from satellite altimetry and radar interferometry to digital terrain models covering large land and ice areas—provide critical input to many scientific models used in oceanography, hydrology, glaciology, geology and related disciplines.

The gravity variations that GRACE will study include changes due to surface and deep ocean currents; runoff and ground water storage on land masses; exchanges between ice sheets or glaciers and the oceans; and densities of mass within the Earth.

As they race around the globe 16 times a day, the satellites will sense tiny variations in the Earth's surface mass below ground and corresponding variations in the Earth's gravitational pull. Regions of slightly stronger gravity will affect the lead satellite first, pulling it slightly away from the trailing satellite. By measuring the constantly changing distance between the two satellites and combining that data with precise positioning measurements from Global Positioning System instruments, scientists will be able to construct a precise Earth gravity map.

Grace is the first Earth-monitoring mission in the history of space flight whose key measurement is not derived from electromagnetic waves bounced off the Earth's surface. Instead, the mission will use a microwave ranging system to accurately measure changes in the speed and distance between two identical spacecraft flying in a polar orbit about 220 kilometers (137 miles) apart, 500 kilometers (311 miles) above Earth.

Grace Project Scientist Dr. Michael Watkins of JPL noted that the twin satellites "chase each other from pole to pole, 16 times a day. The real key to the mission is that we map that separating distance between them extremely accurately."

Watkins compared the sensitivity of the ranging system to detecting gravity separation changes between one item in Los Angeles and another in San Diego to the precision of one-millionth of a meter—about one-tenth the width of a human hair.

A unique aspect of the mission, Watkins pointed out, is that "the two satellites are the instrument," he noted. "A lot of us are used to a satellite 'bus,' with particular devices on the spacecraft that make measurements, like a camera or altimeter. In the case of Grace, it's the separation between the two spacecraft that we're measuring, and that combined system forms our Grace instrument."

JPL has contributed to the GRACE mission with a broad range of project management and systems engineering activities. JPL also provides instruments and computer expertise, including:

- K-band ranging instrument system, which determines the distance between the satellites;
- Star cameras, which are used to orient the satellite in space;
- Blackjack Global Positioning System receiver integration, to determine exact satellite locations;
- Instrument processing unit, which combines information from the GPS receiver, K-band ranging system and star cameras, for transmission to Earth;
- Science data system, the computer system on the ground that extracts the relevant science information from the combination of data send by the instrument processing unit.

"These concepts for gravity mapping—using one or two satellites—date back about 30 years," Watkins said. "The Grace concept dates back a decade ago when engineers at JPL realized that advances in the Global Positioning System, as well as Deep Space Network advances in K-band tracking that were used to track very distant spacecraft, could make the Earth gravity mapping mission much more accurately and more economically than in earlier mission concepts.

"That small group at JPL has evolved into a national and international project involving a number of countries around the world," he said.

Grace is a joint partnership between NASA and the German Center for Air and Space Flight. The U.S. portion of the project is managed by JPL for NASA's Office of Earth Science. Science data processing, distribution, archiving and product verification are managed under a cooperative arrangement between JPL and the University of Texas' Austin-based Center for Space Research in the United States and Germany's Earth Research Center.

More information about the Grace program is available online at *http://www.jpl.nasa.gov/grace*. Information on NASA's Earth System Science Pathfinder Program is available at *http://essp.gsfc.nasa.gov.*

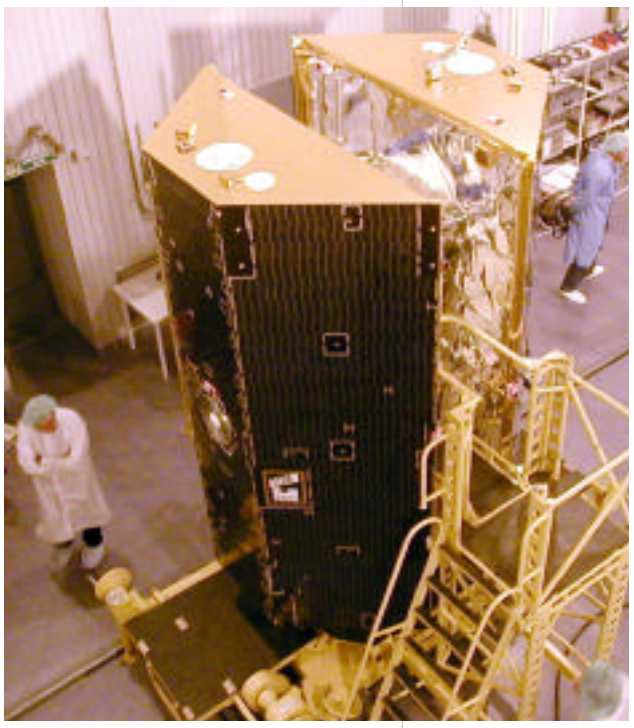


Photo courtesy of Kim Leschly and Margaret Srinivasan

Above: Crew members at the Plesetsk Cosmodrome in northern Russia prepare the twin Grace satellites for their March 16 launch. Left: This image shows the Earth's geoid—a surface of equal gravitational potential that, over the ocean, closely follows the sea surface. The geoid was determined from data collected from previous satellite missions, including the Challenging Minisatellite Payload (CHAMP), the forerunner to Grace.

Retired physician receives asteroid honor

Retired JPL physician Dr. Donal Sweeney earlier this month had an asteroid named in his honor (8378 Sweeney) and was also presented with a plaque to commemorate the naming. Sweeney (second from right) retired from JPL in October 2000 after 10 years at the Lab. He is joined by Senior Research Scientist Dr. Moustafa Chahine (left), astronomer Eleanor Helin and JPL Director Dr. Charles Elachi.

Passings

FRANK BOUQUET, 76, a retired JPL scientist in Section 354, died of diabetes Feb.7 in a nursing home.

Bouquet worked at the Lab from 1978–88. He is survived by three children.

Services were private.

WILLIAM SWANSON, 85, a retired millwright from Section 662, died of Parkinson's disease Feb. 20.

Swanson joined JPL in 1957 and retired in 1981. He is survived by his wife, Helen, daughter Judy and three grandchildren.

Services were private.

ROBERT HILL, 73, a retired contract analyst in Section 652, died of pneumonia Feb. 10.

Hill worked at JPL from 1965–92. He is survived by his wife, Marilyne, one son, three daughters and five grandchildren.

Services were held at Live Oak Memorial Park in Monrovia.

Letters

I would like to thank my many friends and co-workers for their kind support and expression of sympathy following the recent passing of my mother in Egypt. Special thanks to the NMP team for their moral support that was a comfort to me and a reminder of what a wonderful team the NMP is. Also, thanks to 336 for the beautiful flower and sympathy card. Best regards,

Dr. Faiza Lansing

My wife and I, and our granddaughter, would like to thank our many friends in Division 31 and particularly in Section 312 for the sympathy cards and the two beautiful floral arrangements given to us following the death of our daughter, Kathy. We would also like to express our thanks to the ERC for the lovely plant that was send to our home. The many expressions of sympathy and friendship will always remain in our memories.

Carl Sauer

On behalf of my family and myself, thanks to JPL for the beautiful plant. Our thanks to the Cassini MSSO for their generous donation to Dad's favorite charity, Heal The Bay Santa Monica. Words are inadequate in expressing our gratitude to the wonderful management of Cassini's MSSO for their tremendous support in providing me the honor of taking care of my Dad during his last days on this earth. It was the greatest gift of all and will never be forgotten.

Patti Smith and family

My heartfelt appreciation goes to each and every one of you who made my retirement milestone a resounding success. It was a pre-ship review that issued only one action item: enjoy your life. As always, each one of you is very special to me and your individual personalities are indelibly inscribed forever in my heart. I bequeath to you my heritage, and rest assured that your capability and knowledge will sustain both JPL and your mission into the future.

Dennis Ross
Systems Safety Office

Retirees

The following JPL employees retired in March:

Donald Starkey, 44 years, Section 313; Kenneth Atkins, 32 years, Section 160; James Conel, 31 years, Section 327; Alexander Borshevsky, 15 years, Section 346.

Classifieds

For Sale

BICYCLES (4), children's, $15. 626/357-8210.

CAMPING MEMBERSHIP, Western Horizon Resorts and Adventure Outdoor Resort, $5,000 to enter and $425 year, will sell with trailer. 661/248-0111.

CHINA CABINET, 1950s Drexel mahogany, e-mail lelson@altavista.com for photo, $500 cash and carry. 353-9367

COMPUTER, notebook, Sony VAIO PCG-505FX, light on weight, heavy on features and performance, < 1" thin, < 3 lbs. 266 MHz, 4.3GB, 64MB, 10.4" SVGA, Win98 CD-ROM Drive, V.90 modem, port replicator, external floppy, Sony slip case, lithium-ion battery $750/obo. 687-8627, cell.

COMPUTER, Macintosh Quadra 850, monitor, keyboard, mouse, modem, $100. 248-9418.

COMPUTER, notebook, Compaq Presario 1247, AMD kg-2, 400 MHz, 6 GB HD, 96 MB RAM, 56K modem, 10/100 PCMCIA card, CD-ROM, original documentation and recovery CDs, $550/obo. 626/356-0320.

COAT, women's, black leather, belted trench, size 10/12, zip-out insulated lining, worn very few times, $50/obo. 780-0470.

CRIB, Childcraft, with mattress, oak, 3-drawer dresser, makes into bed, exc. cond., $200. 957-3130.

DESK, executive size, walnut finish, $100; FILE CABINET, four-drawer, steel, $75; CHAIR, $25. 626/351-8198.

DISHWASHER, portable, with butcher block, wood grain top, almond color, exc. cond., $150/obo. 626/287-2295.

DRESSES, evening/prom, 2 new designer, one by ABS, size 12, price tag $329, sell $200; one by Sache, size 10, price tag $268, sell for $165. 241-8208, eve, Irena.

FISH TANK, 40-50 gallon, w/stand and supplies, some plants, no fish, needs cleaning, $200/obo. 626/405-9701.

GARDEN HOSE HOLDERS, new, black ironwork, holds up to 100-ft. hose, $60/obo; new, aluminum holds up to 75-ft. hose, $50/obo. 626/791-6101.

HAM RADIO, standard C228A dual band (144/220 MHz) xcvr., gd. cond., extra battr., AC charger, add'l accys, $140. 957-2773.

MATTRESS, Cal. king, fair condition, $40/obo; SHEETS, Cal. king, $10, must be able to pick up in Burbank. 504-6624.

MOVING SALE: weight bench, Golds Gym, plus weights. $100; refrigerator, almond, Frigidaire, 20.6 cu ft., $150; washer/dryer, Maytag, $300; fireplace screen, $10; CB 40-Channel, Cobra, $40. 362-3358.

MOVING SALE: bedrm. set, 8-piece, incl. dbl. bed, dresser, chest, night stand, $250; student desk, $25; office desk, $45; corner bed, $20; curtain rods, $3; hi-fi system, $100; washer/dryer, $250; elec range/oven $75. 248-9418.

MOVING SALE: dining table w/4 chairs, $200; couch, olive colored, 1 yr. old, $400; armoire, $600; coffee table w/storage space, $175; range/oven, gas, $300; other items also available, must sell, moving out of country. 509-1862, Karen.

OVEN, Kitchenaid, electric, self-cleaning, black, $50; COOKTOP, Dacor gas, 5 burners, 36" wide, $50. 790-2915.

PIANO, Clavinova digital, Yamaha CLP 411, exc. cond., black, with bench, $1,500/obo. 626/475-5790.

RAINCOAT, women's, powder blue, cotton/polyester, belted, size 10/12, zip-out insulated lining, seldom worn, $35/obo. 780-0470.

REFRIGERATORS, one is beige, 17 yrs. old, side by side, $100; other is white, top mount, 15 yrs. old, fair cond., $100; TABLE, din. rm., w/leaf, cherry wood tops, black legs, 4 chairs, gd cond., $150; SOFA/SLEEPER, makes into qn.-sz. bed, abstract black, blue and mauve design, good cond., $300. 626/357-8210.

RECEIVER, a/v, Denon AVR-3200, Dolby digital, 85 watt x 5chl/ 6 chl ext. input, 5 chl stereo, $400. 661/255-5645.

SATELLITE DISH, complete TV system, antenna with dual LNBF for operating two TVs separately, 2 receivers with smart cards, model ISD2200 with UHF remote, model 1000 with infrared remote, installation kit with user and installation guide, $100/obo. 626/797-7320.

TICKETS (2), Pasadena Distinguished Speaker Series; April 30, Maya Angelou; May 15, Garrison Keillor; both at 8 p.m.; 3rd row center, $35/each. 626/836-8561, Sam.

TRIP TO MALAYSIA, round trip economy airfare, 4 nts. hotel in Kuala Lumpur, all transfers to/from hotel, tour of city, gd. thru Oct. 29, '02, approx. 6 wks. notice needed for booking; retail value ~$1,000, seeking $500, I won this but can't use it. 323/935-3432.

VIDEO, Disney's Little Mermaid VHS, new, sealed, Special Edition, fully restored with THX sound, $25; other brand new Disney videos also available. 562/420-2313.

WEDDING GOWN, designer Mori Lee, beautiful with capped sleeves, scalloped neckline, satin bodice, overlaid with lace, re-embroidered appliqués, sequins, pearls, illusion pyramid pick-up on front of skirt flows in a wide lace edge to back of dress, deep V-back meets satin bow at waist, no train, size 12, fits 5' 8", can be altered, $150/obo. 241-3779.

Vehicles/Accessories

'98 DODGE Grand Caravan, V6, 3.3L, auto, 60K mi., must sell, moving, $12K. 714/839-5750 or patsward@yahoo.com.

'97 FORD Taurus GL sedan, 84K freeway mi., V6, automatic, 4 dr., a/c, pwr. steering, ABS pwr. brakes, dual air bags, cruise control, pwr. window/door locks, AM/FM stereo cassette deck, tilt wheel, pwr. drivers seat, metallic silver, extra clean, no smoke, 4 near-new Michelin tires, current registration, $4,995. 626/798-1765.

'95 FORD Windstar XL van, rear air, captain's chairs, many other extras, 83,000 mi., well maintained, all records, runs great, $7,000. 626/447-6423.

'94 FORD Mustang GT convertible, leather int., new brakes/clutch, 10-disc CD changer, 5-speed manual trans, $9,000. 701-9260. Steve.

'92 HONDA Accord EX sedan, 4 dr., 106K mi., gd. cond., white w/blue int., auto., 4 cyl. 2.2 ltr., front whl dr., a/c, p/s, p/w, p/dl, cruise cont., ABS, tilt whl., sun/moon roof, am/fm stereo/cassette, anti-theft, gd. tires, $5,900. 626/296-9073, Patti.

'90 HONDA Accord LX sedan, blue, 85K mi., gd. cond., auto trans., stereo/cassette, cruise, power locks/windows, $3,000/firm. 626/796-0023.

'99 JEEP Wrangler SE, exc., black, soft top, under 23K mi., 4 wheel drive, extras, like new, $11,000/firm. 957-7742.

'97 JEEP Cherokee Sport, 85K mi., 4.0 ltr., automatic, outstanding cond., red, full service history, ABS, CD, cruise control, pwr. mirrors, windows, doors, a/c, alloy wheels, tint glass, keyless entry, dual airbags, loaded, new tires, $8,900. 626/683-8087, Felipe.

'97 MITSUBISHI 3000 GT, black with tan leather interior, 5 spd., cruise control, 44K mi., extended warranty, 10 CD changer, LoJack, rear spoiler, rear spoiler, exc. cond., like new, $13,500. 990-0134, Zvi.

'92 LEXUS LS400, silver, original owner, low miles, exc. cond., leather, sunroof, everything except CD, $12,950. 626/355-7318.

'96 SAAB 900S, 3 dr., 5 sp., 80K mi., orig owner, all service records, exc. cond., grn/tan, ABS, alarm, factory AM/FM/cass., new brakes, starter, belts, $8,700/obo. 310/306-7319.

'00 SEABREEZE 5th wheel trailer, 33 ft., 3 pull-outs, blue, 27" TV, 5 CD, am/fm, microwave, side-by-side fridge with ice maker, see for more, $36,000/obo. 661/248-0111.

'99 TOYOTA 4Runner Ltd., 4x4, black, leather, moonroof, running board, tow package, CD, V6, loaded, wooded panels, 27,000 miles, $23,999. 909/599-3230.

'93 TOYOTA Tercel, 2 dr., 37,000 mi., air cond., 4 speed manual trans., exc. cond., w/airbags, $3,000/obo. 626/794-4921 or 323/393-2831, Bert.

Wanted

COMPUTER, bargain laptop, any brand, better if HD> 2GB; RAM>64MB, should be working good and cheap, PCMCIA type II slot for modem/Ethernet cards required. albertobig@libero.it.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.

VOLLYBALL PLAYERS, coed, no beginners please, Tues. nights 8 to 10:00 at Eagle Rock High School, $3/nt. 956-1744, Barbara.

Free

FILL DIRT, clean, haul as much or as little as you want of the 2 cu. yds., located near Los Robles/Jackson, Pasadena. 626/791-3103.

For Rent

ALTADENA, charming 2 bd., 1 ba., house near Christmas Tree Lane; hardwood floors, fireplace, appliances; fenced back yard, fruit trees, roses; includes water, gardener, trash; see www.alumni.caltech.edu/~chrisc; $1,650/negotiable. 626/794-9579.

ALTADENA, furn. rm., share bathroom, full house privs incl. washer/dryer, pets negotiable, female preferred, $400. 626/798-2112.

ALTADENA, near LaViña Estates area, room in home w/access to kitchen/bath/living rm., less than 5 min. from JPL's East lot, near Chaney Trail, walking distance from park w/tennis courts, no smoking/pets, avail. April 1, $600 + $1,200 security deposit. 626/296-2779.

GLENDALE / L.A. border, 2 bd., 1 ba. apt., garage available, Verdugo Rd., 10 min. to JPL. 353-7103.

MONROVIA house, 1 bd., 1 ba., off-st. parking, incl. water/trash, no smoking/pets, carpet, blinds, stove, large kitchen, month-month, gardener takes care of lawn, avail. 4/8, $750 + $500 sec. dep. 714/839-5705.

MONROVIA HILLS, 2 spacious bd., 2 full ba. in a private home, share kitchen and laundry, electricity, water gas and cable included, 12 miles from JPL, no smoking, no pets, $500 each bd. with ba. 626/358-7728.

PASADENA house for lease, near Caltech, available May 1, 3 bd., 2 ba., living room, nice kitchen, fenced yard, 2-car garage, no pets, no smoking, gardener included, $1,300 + $1,300 security deposit. 626/794-0455.

PASADENA, spacious 2-story condo, 3 bd., 2.5 ba., prestigious community, beaut. inter., bright ktch., prof. landscape, ctrl. air & heat, close to shop., cozy l/r with f/p, end unit, frml d/r, hdwd. flrs., immac. cond., close to schls. $1,750. 626/396-9024.

SIERRA MADRE apt., 2 bd., 1 ba., 6 unit bldg, walk to village, view, new paint, carport, $850. 626/355-7318.

SUNLAND, fully furn. room in condo; share kitchen, bath, laundry; gar. parking, a/c, pool, Jacz., tennis court; 10 miles to JPL; prefer upper classman student, male, non-smoking; $500 + 1/2 util., first, last & security deposit. 352-3112.

Real Estate

ALTADENA, walk to JPL, 3 bd., 2 ba. cul-de-sac home on huge 9,700 sq. ft. lot, C/H/A, 2-car attached garage, 9-ft ceilings, large remodeled family kitchen, newer carpet, new lighting in all rooms, cathedral ceiling entrance, built in 1980, $268,000. 626/318-9374, cell.

LA CANADA, 4 bd., 2.75 ba., 2,410 sq. ft., 100 x 148 lot, pool, private backyard, completely remodeled, new kitchen with Corian counters/sinks, high gloss white cabinets, breakfast area, indoor laundry, high ceilings in living areas, new windows/doors/floors, 3 bd. w/own closets, master bedroom with walk-in closet, very bright, $799K. 790-4553, after 6 p.m., weekdays, Sima, or weekends 687-9812.

Vacation Rentals

BIG BEAR LAKEFRONT, luxury townhome, 2 decks, tennis, pool/spa, beautiful master bd. suite, sleeps 6. 949/786-6548.

CAMBRIA, ocean front house, sleeps up to 4, exc. view. 248-8853.

HAWAII, Kona, ocean front on Keauhou Bay, house and guest house comfortably sleep 6, 3 bd., 2 ba., rustic, relaxing and beautiful, swimming, snorkeling, fishing, spectacular view, near restaurants, golf and other attractions. 626/584-9632.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps 4, laundry fac., 4/15-12/14 $105/nite/2, 12/15-4-14 $120/nite/2, $15/nite/ add'l person. 949/348-8047 or jackandrandy@cox.net.

LAS VEGAS, timeshare avail. w/45 days adv. notice, sleeps 4-6, w/full kitch. & bath, TV, VCR, 1 block to the Strip, adjacent to Harrah's and Caesar's Palace. 909/896-2721.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equipped kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/view to mtns., Jacuzzi, sauna, streams, fishponds, close to Mammoth Creek, JPL discount. 626/798-9222 or 626/794-0455.

OCEANSIDE, on the sand, charming 1 bd. condo, panoramic view, walk to pier & harbor, pool/spa, game rm., sleeps 4. 949/786-6548.

OCEANSIDE condo, fully furn., 2 bd., 2 ba., fireplace, full kitch., quiet, relaxing, beautiful beachside setting, BBQ, pool, spa, game room, great ocean view, easy walk to pier and restaurants, sleeps 6, avail. weekly or monthly. 909/981-7492 or dfhauge@yahoo.com, Darlene.

ORLANDO, Fla. timeshare, avail. March 30-April 3, sleeps 4-6, full kitch. & bath, TV, VCR, minutes to DisneyWorld, $440. 909/896-2721.

PACIFIC GROVE house, 3 bd., 2 ba., f/p, cable tv/vcr, stereo/CD, well eqpd. kitchen w/microwv, beaut. furn, close to golf, bches, 17 Mile Dr., Aquar., Cannery Row, JPL discnt. 626/441-3265.

ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.

SILVERLAKES, Calif., resort, golfer's dream, 4 weeks free golf anytime each year, vacation club membership, 2 bd. condo for up to 6 people, two lakes, many amenities, private PGA

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Universe

Editor
Mark Whalen

Design & Layout
Adriane Jach, Audrey Steffan/ Design Services

Chief Photographer
Bob Brown/Photo Lab

Advertising
Susan Braunheim-Kalogerakos

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